## **CLAIMS**

- 1. An isolated nucleic acid comprising a polynucleotide encoding a polypeptide consisting essentially of SEQ ID NO:2, wherein said polypeptide will crystallize and will have at least one biological activity selected from the group consisting of (a) binding a GSK3 inhibitor; and (b) kinase activity.
- 2. An isolated nucleic acid comprising a polynucleotide encoding a polypeptide consisting essentially of SEQ ID NO:3, wherein said polypeptide will crystallize and will have at least one biological activity selected from the group consisting of (a) binding a GSK3 inhibitor; and (b) kinase activity.
  - 3. A vector comprising the polynucleotide of claim 1 or claim 2.
- 4. A polypeptide comprising between about 250 and 419 contiguous amino acids of SEQ ID NO:1, wherein said polypeptide is phosphorylated on tyrosine 216, said polypeptide will crystallize, and said polypeptide will have at least one biological activity selected from the group consisting of (a) binding a GSK3 inhibitor; and (b) kinase activity.
- 5. A polypeptide consisting essentially of between about 278 and 419 contiguous amino acids of SEQ ID NO:1, wherein said polypeptide exhibits at least 1% of the kinase activity of human GSK3β.
- 6. A polypeptide consisting essentially of between about 285 and 384 contiguous amino acids of SEQ ID NO:1, wherein said polypeptide exhibits at least 1% of the kinase activity of human GSK3β.

- 7. A polypeptide consisting essentially of between about 351 and 384 contiguous amino acids of SEQ ID NO:1, wherein said polypeptide exhibits at least 1% of the kinase activity of human GSK3β.
  - 8. A polypeptide consisting of the amino acid sequence of SEQ ID NO:2.
  - 9. A polypeptide consisting of the amino acid sequence of SEQ ID NO:3.
- 10. An isolated nucleic acid comprising a polynucleotide encoding a polypeptide consisting essentially of SEQ ID NO:5, wherein said polypeptide will crystallize and will have at least one biological activity selected from the group consisting of (a) binding to a GSK3 inhibitor; and (b) kinase activity.
- 11. The nucleic acid of claim 10 wherein said polypeptide is phosphorylated on tyrosine 279.
  - 12. A vector comprising the polynucleotide of claim 10 or claim 11.
- 13. A polypeptide comprising between about 182 and 482 contiguous amino acids of SEQ ID NO:4, wherein said polypeptide will crystallize, and said polypeptide will have at least one biological activity selected from the group consisting of (a) binding a GSK3 inhibitor; and (b) kinase activity.
- 14. A polypeptide consisting essentially of between about 182 and 386 contiguous amino acids of SEQ ID NO:4, wherein said polypeptide exhibits at least 1% of the kinase activity of human  $GSK3\alpha$ .

- 15. A polypeptide consisting essentially of between about 182 and 351 contiguous amino acids of SEQ ID NO:4, wherein said polypeptide exhibits at least 1% of the kinase activity of human  $GSK3\alpha$ .
- 16. A polypeptide consisting essentially of contiguous amino acids  $S^{97}$  to  $S^{447}$  of SEQ ID NO:1.
- 17. A polypeptide consisting essentially of the amino acid sequence of SEQ ID NO:5.
- 18. A polynucleotide encoding a polypeptide consisting essentially of SEQ ID NO:6.
- 19. A polypeptide consisting essentially of the amino acid sequence of SEQ ID NO:6.
- 20. A polynucleotide encoding a polypeptide consisting essentially of SEQ ID NO:7.
- 21. A polypeptide consisting essentially of the amino acid sequence of SEQ ID NO:7.
- 22. A polynucleotide encoding a non-phosphorylated human GSK3 polypeptide, wherein said non-phosphorylated polypeptide differs from native GSK3 in at least one and not more than ten amino acids.
- 23. The polynucleotide of claim 22 wherein tyrosine at position 216 of SEQ ID NO:1 is substituted for by a non-phosphorylatable amino acid.

- 24. The polynucleotide of claim 23 wherein said non-phosphorylatable amino acid is phenylalanine.
- 25. The polynucleotide of claim 22 wherein tyrosine at position 279 of SEQ ID NO:4 is substituted for by a non-phosphorylatable amino acid.
- 26. The polynucleotide of claim 25 wherein said non-phosphorylatable amino acid is phenylalanine.